

COST *and* MANAGEMENT

THE OFFICIAL JOURNAL
OF THE

CANADIAN SOCIETY OF COST
ACCOUNTANTS

INCORPORATED 1920

HEADQUARTERS, 81 VICTORIA ST., TORONTO

Telephone Elgin 8914

VOL. 3

NOVEMBER, 1928

No. 11

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A Few Words on Corporate Matters

By W. H. COVERDALE, B.A., DR. SC., LL.D.

Coverdale & Colpitts, New York

(Before Montreal Chapter, September 27, 1928.)

MR. CHAIRMAN and Gentlemen of the Montreal Chapter of the Canadian Society of Cost Accountants:—

As I stand before you on trembling feet, may I venture with trembling voice at the outset to commend your good judgment in offering the tribute of your faint applause before my few remarks, rather than after them. No toast-master could play a meaner or more lowdown trick on his victim than to eulogize him, and thus lead his audience to expect more than they are likely to get. In this instance, your chairman has relied largely on his imagination for his facts;—I recognized only my name and the title of my little speech, and I furnished both of those,—all the rest was bunk.

It is, therefore, with some trepidation that I venture to address you upon this happy occasion lest your joy be marred by a tragedy. Up in Ontario, where I live, we have a peace officer called the Sheriff. Recently, a citizen rushed into the Sheriff's office and announced with great excitement that he had just shot an after-dinner speaker. The Sheriff, without any display of emotion or even interest, replied: "My dear sir, you are in the wrong office. The bounties are paid in the treasurer's office across the hall."

It takes a bit of intestinal fortitude commonly known as guts for a man to try and get away with a story as old as that one, and for a man who cannot aspire to the dignity of a cost accountant to presume to address a representative body of cost accountants on matters allied to that subject; but those of you who are kind will forgive me for that presumption, and those who are not can forget it when I tell you that I have spent, or perhaps misspent, my life masquerading as a civil engineer without the preliminary formality of an engineering education.

Since the calf killed the butcher and the dust bit the redskin, no man has ever known less about cost accounting than I, and so I feel no little embarrassment in having to

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mention that subject at all. In fact, I feel as embarrassed as the Irish servant girl who, on seeing an elephant for the first time, ran to her employer and told him that there was a great gray beast in the garden pulling up all the cabbages with his tail. "Indeed," said he, "and what is he doing with the cabbages after he pulls them up with his tail?" "O, sir," said the maid, "I am too embarrassed to tell you that."

Two Kinds of Training

As a matter of fact, side by side with the technically educated man in every walk of life strides the man who has done for himself everything which has been done for the other fellow. He suffers no comparative disadvantage! He asks no odds! There are many methods by which the mind may be trained and by which experience may be gained,—and, of course, a technical education is one of the best;—but any line of work which teaches a man to think for himself and to act for himself,—and never ask what to do, does as much for him as the best institution can hope to accomplish; and generally does it better, because it creates confidence, self-reliance, resourcefulness and, best of all, that initiative which enables man to talk across the sea, to ride the clouds, to conquer the elements, to annihilate space and to transform the impossible of to-day into the commonplace of to-morrow.

It is not the process of education or experience that counts, but the state of mind which is produced thereby! And if you will bear with one or two personal references as illustrative of what is to follow, I would like to tell you that the first ten years of my business life were spent in the engineering department of the Pennsylvania Railroad, where it was not difficult to qualify oneself for the various responsibilities as they offered. As it then was, and still is, the policy of that company to make as many general officers as possible out of engineers, I naturally felt reasonably confident of inheriting the earth and the fulness thereof in due course.

Every president of that company for the last fifty years, from the renowned Mr. Tom Scott, one of the founders of the great Edgar Thompson Steel Works, (later the Carnegie Steel Company and now the backbone of the United States Steel Corporation), down to General Atterbury, the present incumbent, has been promoted from the lowest rung of the engineering ladder.

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But railroad promotion in those days was very slow,—it moved at about the rate of speed of an arctic glacier and with less friction than an ambitious Malpeck oyster. If one had looked at a fine-tooth comb through that perspective, the teeth would appear to be spaced about as far apart as the poles of a modern high-power transmission line. It was a case of waiting for dead men's shoes and as but few died and none resigned, I gradually accustomed my mind to the loss of the presidency and determined to strike out for myself.

During those years I acquired in one way and another, but mostly by hard work and night reading, a few of the rudiments of engineering knowledge. In fact, it is not too much to say that from the day the first job started, I never felt myself at any considerable disadvantage in having to work alongside of the fellow who had everything in the way of technical schooling.

First Contact With Cost Work

It was during those early years that the first shadow of accounting fell across my path,—cost accounting of a sort, although it was only the distribution of construction costs, as real cost accounting was then as unborn as the radio or the gas engine. Nevertheless, it taught me that the proper doing of a thing is incomplete without the proper recording of it, and that the proper recording of a prior transaction may be very helpful and even essential to the proper doing of a subsequent one; that the doing and the recording are complementary parts of the whole! That a transaction must not only be all right and look all right, but that there must be enduring evidence or proof that it is all right!

I know engineers to-day who run on the wheelbase of a roller-skate, who may be said to have more wax in their ears than brains in their skulls, who are impatient of all accounting restraint, who must be regarded as technical theorists only and as deficient in ordinary business judgment; who are competent to construct, but incompetent to say whether or not the thing constructed is economically sound as well as physically sound.

I have seen accounting and cost accounting departments of large corporations which were about as extinct as the Dodo, and so run that one's first instinct was to telephone

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the Rockefeller Institute to hurry along their best specialist in sleeping sickness; I have seen them as detached from any practical influence as a goldfish in its bowl is unconcerned with general housekeeping problems; I have seen them so out of date and antiquated that if Rip Van Winkle had awakened there after his long sleep, instead of at the Village of Falling Water in the Catskills, he would have thought that his gun was modern and his clothes stylish! I know comptrollers with illusions of grandeur who are so autocratic and dogmatic as to regard a wellkept set of records as a higher accomplishment and more greatly to be desired than the economic construction of a plant or the proper administration of a business. And yet, notwithstanding their unhelpful independence, each would be a useless non-entity without the other; the work of each is even a prerequisite to the success of the other.

Co-operation That Counts

On the contrary, I have seen with pleasure many instances of the closest co-operation between engineers, cost accountants and plant managers,—men who describe their joint service as skill in making a dollar earn the most interest; men who have caused their mutual activity to be defined as an island of ability entirely surrounded by money, with possibility of profit on all sides but three; bounded on the north by the cost of land, labour, materials and capital; on the south by the interest on the investment, on the east by the cost of operation and upkeep, and on the west by the resultant surplus or deficit. And many a bright sun of hope has risen in the morning of that east, only to set in gray clouds of disappointment in the evening of that west.

And so, to-day, we may say that cost accountants, engineers and plant managers are brothers,—brothers on father's side anyhow,—brothers not only in blood and brawn but in brain, united in their joint service of aiding the owners, users and leaders of money to escape the pitfalls which do so easily beset them; and united also to protect their clients' interests to the fullest extent of their ability and experience.

These early attempts at cost distribution, while they taught me that engineers and accountants are members of the same lodge of efficiency, soon brought me into contact with that eternal strife which exists between the construc-

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tion and the operating departments of all corporations. Construction expenditures finally settle into capital accounts distributed along certain well-defined lines, while operating expenses are marshalled against them within other well-defined limits; and perpetual warfare is waged between them over that no-man's land of debatable ground, stretching between good and bad practice.

While this warfare is general in all large corporations, it is especially prevalent on railroads where the competitive demand for efficiency and the lowest ton-mile cost unit of transportation necessitates constant capital expenditures for lower gradients, flatter curvature, wider embankments, stronger bridges, heavier track, more yards and ever increasing capacity of locomotives and cars,—every one of which items involves serious questions of book values, replacement values, obsolescence, depreciation, leases, contracts and value of the property as a whole based on the increased net earnings due to the improvement, before a proper cost distribution can be made between property and maintenance accounts.

Steps Toward Uniform System

But, you will say, where was the Interstate Commerce Commission and its admirable system of classified operating and property accounts, which has made the way easy and the burden light? Well, it was in its infancy, like bootlegging in the Thousand Islands is to-day. It had no classified accounts; it merely made tentative suggestions. The first of the Interstate Commerce Commission accounts was not made mandatory until 1907, and very few of them at that time. Even to-day, depreciation and obsolescence accounts cover only power and equipment items which constitute from twenty-five to forty per cent. of the total cost of property, and the annual rates charged to such accounts are optional with the carrier.

I know one large railroad company which, until recently, was charging depreciation on its power and equipment at the annual rate of one-fourth of one per cent. of its cost, thus by the scratch of a pen extending the natural life of a freight car from, say, twenty years to the attenuated life of four hundred years,—an elongation which took some slight liberty with the ultimate elastic limit of credulity; and not satisfied with that accounting masterpiece, they were even claiming an ultimate scrap value, almost, you

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might say, laying up treasures in heaven,—all of which the Interstate Commerce Commission had no authority to control, as the law merely provides that depreciation shall be charged but is silent as to the rate limits.

Gentlemen, as I look back over nearly forty years of hard work, spent mostly on combined accounting and engineering problems, and latterly on the management problems of railroads and other corporations, the importance of sound accounting practice, covering every feature of construction, operation, manufacturing, costs, merchandising, traffic and overhead expense, becomes increasingly evident. In fact, it is not too much to say that it is of paramount importance; it is the *sine qua non* of all good business without which executives merely deceive themselves and their shareholders into making the worse appear the better reason. It is axiomatic that no dollar can be made to do the work of two dollars and yet I have heard the theory advanced,—in fact, I have seen the accounting policy practised,—of relieving a corporation from the necessity of charging depreciation against its property merely because it was required to reduce its fixed debt by the annual operation of a sinking fund.

Nothing could be more fallacious, depreciation being, as we all know, a straight operating expense against the use and wear of property, temporarily expressed or carried as a reserve because, generally speaking, it must be expended for replacements in large amounts at long intervals; but, in any case, it must be deducted before arriving at a sound net income. On the other hand, sinking fund payments are not an operating expense at all; they merely constitute one form of disposition of corporate net income; and they have no significance whatever in terms of physical property depreciation which goes on just the same whether the corporation be in debt or be free from debt. Any manager of a company who is faced with the necessity of property replacements and debt reduction on the same day should be pretty hard-boiled on the possibility of spending the same dollar twice.

A Problem in Depreciation

One of my first attempts to analyze the use of physical property in terms of its life for accounting purposes was the job of determining the average life of all cross-ties on the Pennsylvania Railroad between Pittsburgh and Chicago,—not difficult,—but not so easy as it may appear on account

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of different classes of track, varying numbers of ties per mile and a wide range of tie materials; but it opened my eyes to the intimate relationship existing between the physical characteristics of material used in railroad building, its life under the traffic conditions imposed by service, and the accounting methods which purport to set forth the cost of such service.

For instance, if the cross-ties in a railroad track be spaced two feet centres, there will be 2,640 ties per mile; and if the average life of the tie be ten years, the tie renewals will run about 264 ties per mile per annum, or \$264 per mile if ties cost one dollar each. Multiply this sum by the number of miles of track operated and you have the approximate figure which the railroad should spend annually for the purpose of keeping its ties in good serviceable condition.

No amount of retrenchment, or alleged economy, or super-management, no accounting sleight of hand or legerdemain, or any other cause whatever, which claims to have produced a large net income by cheaper tie maintenance, can stand the test of sound accounting based on the incontrovertible facts set forth in the well-known mechanics of tie materials. No man, by taking heed, can add one year to the life of an untreated tie or one cubit to his stature.

In like manner, rail, joint, spike, ballast and many other accounts were examined and experiments made to determine normal annual maintenance charges under various conditions of service. The rail feature was the most difficult. Rail has more lives than a cat,—first on heavy duty main track, then on light traffic main track, then on branch lines, then on yard tracks and sidings, then on commercial tracks, then on shop and repair tracks, and finally into the scrap heap; every time it is laid it goes into the accounts and every time it is taken up it comes out; the bookkeeping costs about as much as the labour of laying the rail,—all put in and take out, like Weber and Fields' bank.

Maintenance of Property

No depreciation or obsolescence is charged against any maintenance of way items on a railroad; the life of ties may be taken at from five to ten years; the life of rail varies from one day to fifty years; annual renewals cover all requirements; sometimes the lack of them covers a multi-

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tude of sins as well. Railroads would rather spend two dollars for a given item when they have the money than one dollar when they have it not. The expense must always be cut to fit the revenue; the punishment must fit the crime; but, in spite of good intentions, deferred maintenance often accumulates, roadbed and equipment become inadequate for their needs; money is borrowed on short term conditions and applied to permanent improvements, capital funds are used to hide operating deficits, a floating debt accumulates, credit disappears, maturities impend, bankruptcy results, reorganization follows, old bondholders are assessed and become new stockholders, old stockholders are wiped out and become hostile; new financing, generally inadequate, follows; rehabilitation of property occurs out of capital funds; and the vicious circle begins again, if indeed a circle may be said to begin at all.

As I made progress in analyzing maintenance accounts in terms of the physical characteristics of the various materials represented by such accounts, and thereby learned to judge the condition of a property without inspecting it, I also formed another habit which afforded me much profit and amusement as well,—I began to collect and read the annual reports of railroad and industrial companies. They were a liberal education in themselves and quite as much so in regard to what they concealed as to what they revealed. Some of them, twenty years ago, were really humorous and that is a high compliment to pay to a statistical document, the work of an auditor.

Speaking of humorous statistics, I read in the Gazette a few days ago, "Women spend more on lingerie, statistics show,"—and statistics are not the only things that show it either!

How Old Accounts Were Juggled

Some of these annual reports, read serially, disclosed more juggling than was ever offered to the public in a vaudeville show or a three-ring circus. How they got away with it always will remain one of life's little mysteries; surpluses appeared and disappeared by magic like the rabbit-in-the-hat trick; capital accounts, representing cost of property, were about as stable as quicksand; the profit and loss account was merely a dump for operating expenses, not currently charged out; items were reversed, subdivided, and their identity camouflaged as the occasion seemed to

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require; the painting of a water-tank, the erection of a new section tool house, or the laying of a switch was dwelt upon with great detail and much satisfaction and congratulation to shareholders; but the sale of ten million notes at a discount of forty or fifty per cent., or the pledge of a new issue of bonds as collateral to a growing floating debt, if mentioned at all, was treated as a mere incident of no importance. At times the situation became so bad that no report could be issued until enough time had elapsed to allow the moss to grow over some of the barest spots.

Don't get a wrong impression from all this, gentlemen; it was a long time ago when rebates were legal and business was bad. Railroading is on a better basis to-day; industries,—some of them,—not so good!

In due course, I found out that it is not the cost of fuel, or steel, or labour, or the cost of property, but the cost of money that governs the success or failure of railroad, or manufacturing, or merchandising corporations; I learned that economic soundness should have first consideration; and from that time to the present, I have devoted most of my efforts to the reorganization of companies which find themselves, from one cause or another, in the twilight zone between good and bad credit,—the lame and the halt and the blind, who hobble about on the outskirts of good business and who generally can be cured by an accurate diagnosis, followed by a major operation and careful nursing,—sometimes wet nursing,—through the convalescent period.

To such companies, if my point of view has been helpful, it is because it is based upon engineering experience covering the needs of physical property; upon engineering and general accounting experience covering the requirements of sound operating conditions; and upon financial experience covering the fundamentals of credit, and the cost of money.

Get a Broad View of Job

In other words, my theory is that a man should back far enough away from his job to get a bird's-eye view of it, and to see it in the proper perspective along with the many other factors which go to make for success in corporate results at the end of each fiscal year.

These factors are many and varied. They cover the duties of general officers and of directors, the rights of shareholders and bondowners, the use and abuse of holding

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companies, the causes and effects of receiverships and of bankruptcies, the sound underlying principles of reorganizations and of credit; the duties of fiscal agents, of investment bankers and of investors, (who may invest but who never investigate,—an egg being the only commodity, other than securities,—concerning whose condition the buyer has so little real knowledge,—and even eggs are held up to the light in extreme cases if the purchaser would avoid repentance); the nature and amount of the indentures under which securities are issued; the duties of the trustees of such indentures, of registrars and transfer agents; the sound basis of the capital account, (there are years when the values of fixed assets rise by appraisal like yeast in a balloon, but a little later the balloon generally acquires a puncture and comes down by the well-known law of gravity acceleration in a bog of doubt and distrust; and then all of the major and minor prophets are needed to drag it back over the stony desert of inventory adjustments and operating deficits to the firm ground of cost or market, whichever is lower); the requirements of the physical property, not only for maintenance, renewals, depreciation, depletion and obsolescence, but also for improvements and betterments in order that the growing demands for service or product may be met; the changing social conditions which make for greater safety, shorter hours of work, increased compensation and higher standards of living; the attitudes of provincial legislatures, of royal commissions, and of the public at large; and, finally, the revenues or earnings which may be charged for service or commodity,—and the net income produced therefrom, from which proceed the issues of economic life.

Over all these factors, which may be classified as ant-hills of diversified activities, each swarming with its own specialists in finance, in operation, in maintenance, and in accounting, there towers the great and always active volcano of revenue or gross earnings, surrounded by its foothills of adequate service, mass production, costs, overhead, super-sales effort, property requirements, taxes, and fixed charges. And if you follow with your eye the path of the molten lava stream of revenue, as it flows from the crater down the sides of the mountain, you will see that it is intercepted and diverted by the foothills; that it loses much of its velocity, and rapidly cools and hardens there; so that a comparatively insignificant amount finally trickles through to the distant

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but receptive valley of the surplus beyond, where so many dividend seeds have been planted broadcast on seed catalogue recommendations, and where so many early and late frosts have blighted the tender blossoms of expectancy.

It is my considered judgment that the opportunity for rapid advancement which confronts the young man of today is infinitely greater than it was twenty or thirty years ago; and that this path of opportunity is wide open to the cost accountant by a route as direct as from any other department of corporate affairs.

Volume Without Profits

Only a few weeks ago I was called in to diagnose the case of a manufacturing concern which was doing a business of nearly fifty million dollars per year, without any resultant profit being visible to the naked eye. They are engaged in making a very specialized line of product with which I was entirely unfamiliar,—automobile bodies. This concern had been refinanced adequately only a year or two ago; its credit was good; it enjoyed a well-established trade position; and yet the mountain being in labour had brought forth but a mouse.

We inspected the plants and found good average conditions; we interviewed foremen and heads of departments until we learned enough about their duties to listen intelligently as they talked; we brought them all together for exchange of views, but after several such meetings we were no nearer a solution of the problem. We visited the plants of rival concerns without finding any better conditions. The manufacturing end of the business was all right. The cost accounting seemed to be, and actually was, carefully and ably done, and was checked and rechecked as to quantities of material, direct labour and costs, until every tack and drop of paint were meticulously accounted for and no minute of labour was overlooked. So far, perfect!

Then came the questions of factory burden and overhead,—questions which cannot be answered as definitely as matters of direct labour and materials, for the reason that their equation contains unknown quantities one of which at least must be assumed in order to solve the others.

It was said a few years ago that steel bridge design might be defined as a certainty added to a guess, divided by a guess. The certainty was the approximate weight of the

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structure; the guess to be added was the assumed maximum weight of any locomotive and cars which would pass over it; and the guess to be used as a divisor was the factor of safety to be provided on account of concentrated axle loadings, impact due to speed, and range of stresses due to variation in quality of steel. The only reason that any steel bridge stood up to its increased loading, brought upon it by the passing years, was that the factor safety had been made very large on account of the uncertainty involved in the calculation. In other words, pure reason had been superimposed upon pure guesswork.

When we reached the questions of factory burden and overhead, we found one of the niggers in the woodpile; and that was the assumption that any given contract covered a definite number of car bodies which would be delivered over a definite period of time, thereby enabling the factory to run at a definite rate of output, and at a definite ratio of factory burden and overhead to direct labour.

As all of these matters were beyond the control of the manufacturer of bodies and entirely in the hands of his customer who sold the complete car to the public,—and as optimistic representations by such customer would certainly result in price concessions by the manufacturer,—we next tabulated all prior contracts for the purpose of comparing the estimated basis as to total deliveries and rate of delivery upon which overhead had been calculated and sales made, with the actual conditions which had developed during the carrying out of such contracts.

The result was amazing! Theoretical overhead upon which sales had been predicated was less than one-third of the actual overhead incurred under operating plant conditions. The bad customer profited at the expense of the good customer. The seven lean kine were eating up the seven fat kine. The excess overhead was twice the estimated profit and nearly twice the direct cost of the product!

Again, on these contracts, it was necessary to tool up at large expense before quantity production could be achieved. Tools and dies for a good size job cost six or seven hundred thousand dollars of the manufacturer's money, to say nothing of the cost of his inventory and labour before he could bill his customer on delivery of finished goods. We found this concern amortizing the cost of its tools and dies over the maximum number of bodies estimated

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to be delivered under the contracts, thereby reducing the alleged cost per body, but thereby also allocating to itself a large item of unamortized useless tools and dies at the completion of deliveries which, owing to the customer's poor design or weak sales effort, were often less than one-half of the contract amount.

You would think that one such experience would be enough but this had gone on for years until it was merely regarded as a competitive trade condition or handicap over which the manufacturer had no control. There was so little co-operation between officers of this concern, so little co-ordination of the various parts of the whole, that in very truth the left hand knew little or nothing of what the right hand was doing. Samuel Butler asks, "What does the right hand gain by being more active and useful than the left,—but only more labour and pains?" But I tell you that it gains skill and experience which results in chest expansion and muscle development, and benefits the whole body as well.

Some of these people were merely patronizing their work by falling asleep over it, and by looking forward to another decade of triumphant stagnation along obsolete lines. I warn you against getting fatty degeneration of your opinions, or opinions so rigid and stiff on any subject that you are unable to keep abreast of the times by modifying your views when necessary.

As some of you may now be getting sleepy under my preaching, I will hasten to a close. A cost analyst might say that the body of a man, weighing 150 pounds, if divided into its component chemical elements, would contain enough water to wash a pair of blankets, enough iron to make a ten-penny nail, enough lime to whitewash a small chicken coop, and enough sulphur to kill the fleas on a good sized dog,—all of which elements could be purchased at any corner drug store for 98 cents.

That is one way of auditing ourselves, but another and better way is to realize that integrity of character is the foundation of success; that it is the backbone of the structure of one's personal life; that it is the influence for good which benefits all of our contacts with one another, and which heightens our confidence in all human relationships. And as business is based upon credit, and credit upon confidence, and confidence upon character, it seems to me that a very special obligation devolves upon every one of us who

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may be connected with the conducting or recording of corporate transactions, not only to realize the importance of character upon business progress, but to cultivate it as the most essential part of his personal and professional equipment.

Gentlemen, less than twice the span of my own life separates it from that eventful day in the history of Canada which brought a glorious immortality to Montcalm and Wolfe on the Plains of Abraham; and but four times the span of my own life is needed to carry it back to the founding of the Hudson's Bay Company and to the appointment by Louis le Grand of the great Count Frontenac as Governor of New France.

What a wonderful tide of opportunity has flowed into the sea of Canadian history and progress in that incredibly short time; what a still more wonderful tide of opportunity is at its flood to-day, accelerated by all the accomplishments of the past, heightened by all the needs of the present, and ever rising toward all the hopes of the future.

May we of to-day be able to say of the growth of Canada, as Aeneas of old said of the building of Carthage and the founding of Rome,—a part of this I was!

Prizes for Papers by Junior Members

TWO prizes are offered for papers delivered before Chapter meetings by Junior members during the 1928-29 session. The first prize is \$25, and the second prize \$15.

Junior members are invited to submit papers to the Executive of their Chapter, through the Chapter Secretary. The Chapter Executive will select those, not over three in number, which it considers the best, for the authors to read before the Chapter. The members of the Chapter will then select one by vote. The winning paper from each Chapter is to be forwarded to the Secretary of the Society by April 30th, 1928, and the directors of the Society will have them judged and the prizes awarded.

The papers may deal with any phase of cost work.

An Outline of the Bedaux Point System

By W. R. HODGSON

*Industrial Engineer, The Canadian Kodak Company, Ltd.,
Toronto.*

(Before Toronto Chapter, October 24, 1928.)

IN introducing my subject, I would like to speak very briefly upon one or two general phases of the problem of correctly rewarding labour. The methods in use to-day can be broadly divided into three main classes:—Time work, piece work and time standard systems.

Time work is apparently the only payment system that operates where the duties of the worker are general and varied. The system has been handed down from times previous to the present industrial age. It holds out no incentive to the worker and often operates unfairly both to him and the employer. Its one commendable feature is its ease of operation. As methods of manufacture became more highly organized and the ideas of mass production and the specialization of labour commenced to take form, the idea of piece work was evolved, and instead of paying a man for his time, you paid him for the amount of work he performed. This method gives the most liberal incentive to the operator. The methods originally adopted to establish the rate were to ascertain the time from some previous performance, or from a trial run by a fairly good operator and take this time at a definite rate per hour. Later on, the time was ascertained by time study methods. An unfortunate feature of the piece rate method is that your price is thrown out of line by fluctuations in the standards of living, and the law of supply and demand as it relates to the labour market. Some of your piece rates, therefore, are probably raised, others lowered in an effort to keep pace with these fluctuations, until, after a space of time, it is difficult to discover the original basis for these rates. Too often, in the past, it has been the case that as extra good performances have been put up, piece work rates have been cut to bring operators' earnings within some pre-determined sum, thereby readjusting a rate to the standard of living. Operators, as a class, sensing this, have held back production to protect their piece rates.

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To guarantee a piece work rate for any length of time is to invite trouble. A piece rate is based upon two elements:—time, which is a constant, and the market value of labour, which is variable. Even if your time element has been correctly ascertained by modern time study methods, you are still up against the variable element:—the market value of labour. After the piece work rate has been set, and, we will say guaranteed, should there be a period when labour prices are on an upward trend, you would either have to raise your rates or lose some of your best help. On the other hand, if labour prices were to slump, you have to choose between paying the guaranteed prices and thereby absorbing a higher labour cost than your competitor or lower your rates and break faith with your employees.

The natural step forward was to devise pay systems which separated the time value from the money value and to allot to an operation, a definite time value rather than a price. The earliest systems of this kind were those introduced by Halsey and Rowan. At the time they were introduced, time values were too often based on previous performances rather than on time studies. Modern methods are now being employed on a wider scale, whereby time standard systems are based on scientific methods of time study. One of the most recent of these is the Bedaux method, with which we are concerned to-night. It has one or two original features that I believe are not found in the other methods. I will now endeavour to build up the story of Bedaux from its first principles.

The Bedaux Point or B Unit

Muscular effort, which forms the basis of the greater part of productive work in our factories, can be measured with a fair degree of accuracy. We do not claim that it lends itself to such exact measurement as a hundred weight of material, but the degree of error can be kept down to a very small percentage. The first step under Bedaux is to measure this effort in a unit of time value. The unit of measurement adopted is known as the Bedaux point or B and represents one minute of normal effort. In passing, it is well to remember that effort requires relaxation, and that, therefore, when we speak of one minute of normal effort, we are referring to two factors:—a fraction of a minute of physical effort and a fraction of a minute of necessary relaxation, the total of these two factors always

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equalling one minute but the variation between them depending on such elements as the exertion, strain and concentration involved and also the length of the cycle.

In applying this unit of measurement to a productive job the first consideration is what we will term the layout of the job:—the location of the materials, the materials themselves, the speed of the machine, the type of operator, are they the ones best suited to the operation? Under fairly good supervision these questions may have already been studied and often satisfactorily answered. Quite often, however, it is an actual fact that the foreman is too near his own problem to see certain possible improvements and that the trained eye of a time study man, a stranger in the department maybe, but with experience in other departments, can suggest other methods or ask questions which lead to some changes being made in the set-up of a job.

Standard Practice

The routine of the job having been established, whether it is the best or not, is recorded in writing on what we term our "Standard Practice." Our chief use of this is to definitely record the movements of the operator. It may also show the speed of machine, tools used, perhaps a rough sketch of the bench showing the location of the operator with regard to materials and fixtures. Having arrived at this point, the job is now time studied. We use, what we believe to be the most advanced methods of time study. The job has already been split down into convenient elements when writing up the "Standard Practice," and these are now timed with a decimal stop watch. We rarely use averages. If there are say three elements to the job, our usual custom is to time just as many performances of each of these three elements as we want, usually somewhere between ten and thirty. After a certain period of study, the time study man is in a position to take certain selected readings on each of these three elements as representing the idea, and also, at the same time, to give the operator a speed rating or grading. In making these readings, all lost time is of course eliminated.

Modern time and motion study work requires the time study man to detect unnecessary, lost or false motions. On the other hand, he must also be just as ready to appreciate the highly efficient operator who has reduced his physical motions to the minimum and is really working at a much

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higher speed than an untrained observer would give him credit for. Between these two extremes there are "all sorts and conditions" of operators. The chief requirement of a time study man is this ability to say that an operator is producing at a normal speed, or at a speed ten or twenty per cent. above or below normal as the case may be. We use different terms. Normal we class as a 60 B Hour, producing 60 B's in 60 minutes. Our men grade the operators in such terms as 50, 60 or 70 B Hour. Our 75 B Hour would correspond with your 25% above normal.

The total time having been measured for one piece, this figure is raised or lowered or left alone, depending upon whether the operator's grading was say 55, 60 or 65. An addition of a rest and delay allowance is also made to the figure, depending upon the class of work involved. You have now arrived at the time standard of the job. It is obvious that the foregoing methods can only be put into practice when you have a bulk output of a fairly standardized product. For the past twenty years or more the Kodak organization has been building cameras, spooling film and putting up packages of photographic paper. There is the possibility that they will be turning out similar products twenty years hence. Changes in operating methods, in machinery and in the goods themselves come along from time to time but our business seems to lend itself favourably to a study of this kind.

Measuring Individual Performance

When the bulk of the operations in a department have been put on standards, you have a unit by which you may measure the performance of various operators, something that you did not formerly possess. A normal operator will under normal conditions produce 60 B's in an hour.. You will find that right from the start you probably have operators ranging from say 40 to an 80 B Hour. You have the means to check up on the effectiveness of operators of different classes within the department, of a similar checking up between departments and between plants.

Let us turn aside for a few minutes to the consideration of the money basis. It is necessary to establish an hourly rate, which we term the base rate, for every class of labour involved. This rate should be the fair market value of that class of labour. Former earnings under piece work may not be of much use in establishing base rates,

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because the application of a time standard system sometimes shows piece work prices to have been all over the map.

The base rate is paid for every hour that the operator is in the plant. For this he is expected to turn out 60 B's per hour. Should his performance fall below 60, he is still paid this base rate. Continued performance below 60 would indicate that the operator is unsuited to the job.

Premium Rate

A premium rate has also been devised to take care of B's produced in excess of 60. To obtain this premium rate, we take the base rate, divide by 60, giving us the rate per minute and then take $\frac{3}{4}$ of this figure. This is, to the operator, the value of the premium or excess B.

By way of example, we will say that you have a group of operators working for an eight hour day and that the base rate of this class of labour is 60 cents. The day totals 480 minutes, therefore each operator is expected to produce 480 B's or more.

One operator only works at a 50 B hour. He produces 400 B's in the eight hours. For this he receives his base rate—60 cents per hour for eight hours, a total for the day of 4.80.

Another operator works at a 60 B Hour. He produces 480 B's in the eight hours. For this he likewise receives 4.80.

Another operator in the same class works at a 70 B Hour. He produces in the eight hours 560 B's. By producing 560 B's in 480 minutes, he has produced 80 excess or premium B's. He is paid his base pay 4.80 as are the other operators and in addition a sum of 80 times the premium rate, which in this case would be 80 times $\frac{3}{4}$ of a cent or 60 cents. His total pay for the day then is 5.40. You will detect an apparent discrepancy or shortage of 20 cents. The manufacturer does not save this 20 cents. This is put aside with all other sums from all operators producing over 60 and from this fund payments are made to certain non-productives as warranted.

Comparison With Piece Rate Payments

Let us compare the payments that these operators would have received under a just piece work price. We will suppose that your former piece rate fitted the job so nicely that it exactly matches up with the Bedaux pay at normal efficiency.

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Then your 60 B Hour operator who receives 4.80 for his day's work under Bedaux would have received 4.80 under the piece work scheme.

Your slower operator working at a 50 B Hour also received 4.80 under Bedaux. Under piece work he would have received only 4.00.

Your faster operator working at a 70 B Hour receives under Bedaux 5.40. Under piece work he would have received 5.60.

While an operator is working at speeds below 60 this system operates as time work. At speeds of 60 and up, as far as the manufacturer is concerned it operates as piece work, because as I have already stated, he actually pays out the full value of the excess B, paying $\frac{3}{4}$ of it to the operator and setting aside the other $\frac{1}{4}$ in the fund for non-productives.

How does this method of payment appeal to the operator? With many bitter experiences in the past, labour is apt to look with suspicion on any change in pay methods. This is to be deplored, but this attitude is not perhaps unreasonable. Many operators frankly would interpret the example I have just given you in this light. While I am working at a normal speed I get 80 cents for 80 B's. After I have speeded up and am able to turn in excess B's, for these excess B's I get 60 cents for 80 B's. How can this be justified?

It must be borne in mind first that the operator gets excess production, partly because he gets good service from the non-productives, such as handlers and truckers. He will probably get better service still when these handlers are themselves on an incentive system of payment. It is therefore a perfectly fair proposition that he should himself contribute to the premium payments made to non-productives. He should also bear in mind that he is not penalized should his production fall below 60, as he would have been penalized under the piece work system. His standards are also guaranteed, while under piece work there was a feeling of insecurity on this point.

Base Rates are Stable

I may say here that we do not guarantee base rates. It is, however, a fact that a base rate, once fairly set, usually stays put. Undoubtedly, if the labour market should take

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a decided rise or fall, it would be up to any manufacturer working this system to adjust his base rates accordingly, just as he would, in all probability, change his piece work rates. In the largest department we have on Bedaux not a single change has been made since the installation four and a half years ago. We put in our base rates with the intention of leaving them at this figure. Small fluctuations in the labour market do not necessarily call for a revision. It is only a decided rise or fall in the price of labour, rendering your base rate unfair to either employer or employee that calls for a revision. We would never consider reducing a base rate because a few operators succeeded in taking home wages considerably above previous averages. Right there lies the curse of piece work rates in many concerns.

The operator's premium is figured up daily. Therefore, premium earned to-day, is not affected in any way by a poor day to-morrow. He is also protected against any lost time, over which he usually has no control. The power goes off, or the operator goes down to the plant hospital, or he runs out of work. A general rule around our plant is, that for every delay exceeding three minutes the operator turns in a lost time card and is given this time at 60. He also gets time at 60 for any work that may not have been put on standards. Certain jobs are from their nature not easily standardized, other jobs come around so rarely and in such small runs, that it scarcely pays to study them. The duty of the standards department is to get as much as possible of the work on standards. However, work at 60 or lost time at 60 does not in any way penalize an operator. An operator comes in and works for four hours on Standards and attains a speed of 85, or an excess of 25 B's per hour. At the end of that four hours he has accumulated 100 excess or premium B's. The next four hours are taken up with work at 60 and lost time. By giving him his time at 60, at the end of the day he still has his 100 premium B's intact. The only way he could lose any of those 100 B's that he accumulated in the forenoon, would be to go on another job covered by standards and fall below 60.

Every day we exhibit in the department a posting sheet. This sheet is divided into sections and each operator is allotted a section headed by his name and number. In each operator's section of this sheet we show the results day by day for a week. It is posted every day, giving the results for

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the previous day. The facts shown here are briefly: Hours worked; Total B's for the day; Average B Hour for the day; and premium earned. One advantage that Bedaux has over many time standard methods is that the operator can easily understand it. There are time standard systems that would require the operator to have considerable mathematical ability to check up the people who are making up his pay. This is one decided advantage of the Bedaux system.

Non-Productive Departments

As far as we have gone now you have the productive workers of a department working against standards. This department is producing several thousand Bedaux points or units of effort per day. Now, let us turn to the Non-Productive side of the picture. What we want to know now is: For every thousand B's produced, how many minutes of supervision are required, how much of handling and maintenance and so on. At the beginning of my paper I stated that we do not claim to be able to exactly measure productive effort. We only claim that it can be measured with a very small margin of error. Therefore, you will get Standards that are slightly tight or loose—the amount of variation depending upon how good a job you do when you are installing the system. But when you turn to the Non-Productive side, you are up against a far different problem. Can it be ascertained, with any degree of accuracy at all, just how much supervision, how much handling you need to support one thousand B's of production? Yes, it can, but the degree of accuracy is nowhere near as fine as on the productive side. Furthermore the condition may change from day to day and it would be a hard matter to devise means to keep track of changes. Anyhow, we have made this measure in our departments working under Bedaux and it has resulted in every case in very nice savings on our costs.

Let us take Supervision. The term itself is self-explanatory. Among a supervisor's many duties the first undoubtedly is to maintain the quality of the product. Then he has to see that production is going through smoothly, he has to maintain discipline and see that inspection, handling and maintenance men are giving efficient service. As conditions become highly organized, the shop carries itself largely on

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its own momentum. I think a fairly good test of a supervisor's efficiency is his ability to go away on a fishing trip and come back and find that everything has functioned just as smoothly as if he had been on the job.

If this supervisor were the proprietor of this self-contained department, instead of being a paid employee, what would he do with his spare time? He would in all probability be figuring out ways and means of saving lost time and cutting down expenses. He has two eight hour clerks, because there are about ten hours of clerical work to do, more than one clerk can manage. Acting as proprietor you might find that he would dispense with the services of one clerk and do some of this work himself. If, by doing so, he in any way interfered with supervision duties, he would be using up valuable supervision time for clerical work and in addition getting inefficient supervision. A better proposition would be to study means whereby he could minimize the work by more efficient lay-out, or he might utilize this clerk's spare time for other duties. As proprietor you would probably find that he would adopt some such course in every corner of his plant to save money. Bedaux puts that very proposition up to the supervisor. In addition to his regular salary, he is paid an extra sum for the savings he can make for the company. As the savings rise and fall, according to his performance against a stated par, so do his premiums rise and fall with his performance. The handlers and maintenance men, etc., all have duties to perform in order to support every thousand B's going through the productive end. They do not present so many difficulties as supervision, because their duties are more physical than mental.

Standards for Non-Productive Departments

In a department containing say from twenty-five to thirty productive operators working at a good speed, you have a flow of about two thousand B's going through the department per hour. This hourly flow demands service from the foreman, handlers, etc. The amount of service required per hour of flow, however, is not consistent. It ebbs and flows considerably, showing periods of stress and also periods of comparative quiet. In spite of this fluctuation, however, we claim it is reasonable to suppose that time studies taken on non-productives over a long enough period of time during a normal period of production, should give

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data sufficient for the setting up of standards of time and cost on the non-productive side.

The non-productive side of a department is studied by conducting all day studies on the various people that make up your non-productive force. These studies should not be taken at peak production, nor at its low ebb, but taken at a period of average production with conditions around normal. Each non-productive is studied in turn, usually for one whole day each. If there are two or three handlers in the department, whose duties would overlap, these handlers should all be studied on the same day with a time study allotted to each of them. We have usually found that one day's study per man is sufficient, although there have been occasions on which we have gone back and taken further studies. During the course of this study, we grade the man studied similar to the grading I have already referred to in our productive studies. The time is reduced to a common basis, a 60 B Hour, and again, all lost time is eliminated.

Premiums Set Here Also

Just as on the productive side, we do not pay premium for a speed of 60, but set as an objective speeds around 80, at which point premiums become really attractive, we apply this same argument to the non-productives. We have in our possession the amount of B's going through the department in a normal day. We also have the number of B's or minutes of supervision, maintenance, etc., worked at a speed of 60, which is necessary to support those productive B's. Having 80 as a desirable speed or performance at which you are justified in distributing a liberal premium it is a simple matter to adjust the ratio to this desirable speed.

Before leaving this feature of non-productive studies and set ups, I would like to emphasize the fact that this feature presents many and varied problems. Compared with this, your productive studies are comparatively easy and straightforward. The possibility of error here is far greater. Non-productives do not present the same field for measurement as do the productives.

The Bedaux Co. Engineers have had the advantage of studying these problems in a wide variety of plants and industries, and undoubtedly are the men best equipped for making studies and set-ups of this nature.

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Having decided from your studies that say 12,000 B's of Production are entitled to 400 B's of Supervision and 600 B's of Handling, you have ready to apply a definite ratio between non-productive labour and amount of production. Your 400 B's of Supervision bear a ratio of 1 to 30 to your 12,000 B's of Production. Your 600 B's of handling would likewise give you a ratio of 1 to 20. Now, it is obvious if the productive labour in this department is all of one class bearing a 60 cent base rate, then the standard productive cost per B in that department is one cent. It is also a simple matter to figure up the Standard Non-Productive Cost per each B of Production. Your ratio shows that each B of production bears a burden of one-thirtieth of a B of Supervision, one-twentieth of B of Handling and other fractions of a B of maintenance, and so on. Wage rates have been established on all these non-productive classifications. It can be readily seen, therefore, that to the standard productive cost of one per cent. per B must be added a standard non-productive cost of say one-quarter of a cent. You now have a control of labour from the standpoint of cost per unit and speed.

The Analysis Sheet

If you will now turn to the Analysis Sheet we will lightly run over our method of tabulating this control. In these examples, I have used fictitious figures suited to illustrate my points and have used round figures and kept unnecessary detail off the sheet. I have taken four days to illustrate the progress that usually follows a Bedaux installation, where a definite effort is made to eventually attain the various standards set. We will suppose that day No. 1 is just one selected day's performance about a month after the installation, day No. 2 a selected day a month later, and days No. 3 and No. 4 each taken at succeeding intervals of about a month.

I have assumed that there are three classes of productive labour in this department—that the output calls for equal production from 35, 40 and 48 cent labour. The weighted rate would in this case be the average of these three figures—41 cents. One-sixtieth of 41 cents gives you the standard productive cost per B (.00683 which appears in Col. 37). The Ratios for Non-Productive Burden appear at the heads of Cols. 17, 18, 19, etc. The total of the five fractions $1/30$, $1/40$, $1/20$, $1/60$ and $1/40$ is $3/20$,

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which is equivalent to a ratio of 6.7, which appears at the head of Col. 28. These fractions of minutes of non-productive labour have definite values, which when added, give you the Non-Productive Standard Cost per B of Production. This shows in Col. 50. The sum of the two standard costs shows in Col. 52.

I will now illustrate the working out of day No. 1. The operators' Bedaux cards are made up by the department clerk and the production and standards entered against the various operations. They are sent over to the main office, the standards are checked, extensions figured and checked, and operators' performance and premium earnings figured and these results are entered on the posting sheet. The information on the cards is then tabulated for the purpose of making up this Analysis Sheet. Cols. 1 and 2 show that you are using the full time of 20 productives and 4 non-productives. Col. 4 shows $159\frac{1}{2}$ hours, Col. 15 shows a half hour of lost time (we will say an operator visiting the hospital). This makes 160 hours and with an eight hour day this represents the full time of your 20 operators. Col. 5 shows 32 hours of non-productive work; this matches up with 1,920 minutes shown in Col. 28. Col. 6 is simply a total of Cols. 4 and 5. The tabulation of the cards shows that 8,463 Standard B's were produced and 1,257 B's of production at 60. These figures are entered in Cols. 7 and 8 and totalled in Col. 12. The department has produced 9,720 B's and has to account for $159\frac{1}{2}$ productive hours. Dividing hours into production we get a result of 61. This is the effective speed or B Hour of the department and is entered in Col. 16. In Col. 14 we have 570 minutes of lost time (such as waiting for work, machine break down, etc.). This operates as a penalty to the department but not to the operators, who receive payment at 60 for this time. They also spent considerable time, 1,257 minutes (Col. 8) in work which was not covered by standards. It can therefore be seen that although 61 was the effective speed of the department, the operators while working against standards were putting up a performance better than 61. To arrive at the operators' speed on standards it is merely necessary to deduct from your total production any B's worked at 60 and to deduct from your time the time consumed at 60, also the time lost, as shown in Col. 14. A division of the remaining time into the remaining production will give you a result of 66, which we enter in Col. 13. Let us note, in passing, a

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Bedaux Analysis Sheet

Date	Number of Operators		No. of Operators Below Standard of 60 B's per Hour	HOURS		Total Hours
	on Direct Operations	on Indirect Operations		on Direct Operations	on Indirect Operations	
1	20.	4.	6	159.50	32.00	191.50
2	20.	4.	6	159.00	32.00	191.00
3	20.3	3.7	2	162.50	29.50	192.00
4	14.3	2.7	—	114.00	22.00	136.00
	1	2	3	4	5	6

DIRECT B'S						
Date	Operations on Standards	Operations Not on Standards (@ 60 B's per Hr.)	Job Standards	Total Direct B's	Less Scrapped Work	Net Total B's
1	8463	1257				9729
2	9397	1048				10445
3	10447	1156				11603
4	8570	280				8850
	7	8	9	10	11	12

Date	Operators "B" Hour	ALLOWED TIME IN B'S		Department "B" Hour	Supervision 30	Inspection 40
	Average Speed per Hour on Standards	Lost Time Dept. Responsible	Lost Time Dept. Not Responsible	Speed Realized By Dept.		
1	66	570	30	61	480 20	260 37
2	69	300	60	66	480 22	240 44
3	75	280	71	480 24	300 39
4	78	78	480 18	210 42

INDIRECT "B's"									
Date	Handling 20	Clerk 60	Maintenance 40						
1	460 21	300 32	420 23						1920 5.1
2	400 26	300 35	500 21						1920 5.4
3	390 30	240 48	360 32						1770 6.6
4	240 37	150 59	240 37						1320 6.7
	19	20	31	22	23	24	25	26	27
									28

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Date	Allowed B's to Equal Standard	Capacity of Dept. in B's	DIRECT PAYROLL				
	No. B's Less Than 60	B's	% in Opera- tion	Total Amount	Paid for Production @ 60	Paid for Work Scrapped	Paid for Allowances
	Per Hour						
1	458			73.36			
2	313			77.77			
3	35			85.15			
4	—			61.22			
	29	30	31	32	33	34	35

Date	COST PER DIRECT "B"					Indirect Pay Roll
	Actual Cost per Direct "B"	Standard Cost per Direct "B"	Cost of Production @ 60. per Direct "B"	Cost of Scrap per Direct "B"	Cost of Allowances per Direct "B"	
						Total Amount
1	.00780	.00683				17.91
2	.00745					17.91
3	.00734					16.79
4	.00692					13.31
	36	37	38	39	40	41

OTHER EXPENSE					Indirect Cost Dept. Not Responsible	Net Indirect Cost	
Date	Fixtures	Tools	Material	Total		Net Total	
1							
2							
3							
4							
	42	43	44	45	46	47	48

Date	Cost of Direct Per Direct "B"		TOTAL COST PER DIRECT "B"			Supervision "B" Hour Efficiency of Dept. in Production and Cost
	Actual	Standard	Total Actual	Total Standard	Ratio, Actual to Standard	
1	.00184	.00131	.00964	.00814	.84	51.24
2	.00171		.00916		.89	53.74
3	.00145		.00879		.93	66.03
4	.00160		.00842		.97	75.66
	49	50	51	52	53	54

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further penalty on the productive side, which has acted automatically. Col. 3 shows that 6 operators out of your 20 were working below a 60 B hour, and Col. 29 shows by how many B's in total they fell short of normal. Had it not been for this fact your Operators' B Hour and Department B Hour would have been greater. Cols. 17-28 show the amount in minutes of non-productive time consumed both in items and total. These columns also show the Standard Ratios or par that have been set up. The actual ratio or performance is obtained, of course, by dividing the non-productive time consumed into the B's of production. The 1,920 B's in Col. 28 divided into the 9,720 in Col. 12, gives a result of 5.1. The Standard Ratio is 6.7, therefore the department has failed to meet its standard. Col. 32 shows the total productive pay roll. This covers the amount paid to the productives plus the amount set aside for non-productive premiums. The amount 73.36 divided by 9,720 (Col. 12) gives a result of .0078, which is entered in Col. 36. This shows that the department did not get down to the standard productive cost, which shows in Col. 37. The reasons are: lost time and operators working below 60. Col. 41 shows the Non-Productive Pay Roll. Dividing this sum, 17.91 by 9,720 (Col. 12), you get the Non-Productive cost per Productive B. This is entered in Col. 49. The Standard is in Col. 50. Here, again, the department has failed to meet its standard. The reason for this we have already seen was shown in Cols. 17-28. There was too much non-productive time turned in for the amount of production. The two actual cost figures in Cols. 36 and 49 are added and the sum entered in Col. 51. We now have the total actual cost per B matched up against the total standard cost per B. By dividing the actual .00964 into the standard .00814 we get the figure .84 entered in Col. 53. This means that the labour cost for that day shows an efficiency percentage of 84. We have now two efficiency measures made on the day's work:—a department speed efficiency of 61 (Col. 16) and a cost efficiency of 84 (Col. 53). By multiplying these two factors you get a combined or final efficiency figure which we term the Supervision B Hour. That is entered in Col. 54. This is the figure upon which we measure the efficiency of our supervisor and his staff.

Just as we say to the productive operator that we will pay him a premium for any performance above 60, so we say to the supervisor and certain members of his force that we

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will likewise pay them premiums for a Supervision B Hour over 60. For every point above 60 in the Supervision B Hour we pay to the foreman of this department a premium of one-sixtieth of his wages. Thus, when he can get a Supervision B Hour of 70, he receives a bonus of one-sixth of his salary. When he reaches 80 his bonus is one-third of his salary. If he should be able to get as high as 90, he would get one-half of his salary as a bonus. Similar payments would be made to the handlers and maintenance men. If a man is only part time on handling, we would naturally pay him his premium just on the amount of handling time and not of course on his full week's salary. On the productive side we pay on the daily result. On the non-productive side we pay on the weekly result.

Day-to-Day Progress

Now, let us turn to day No. 2 and see what progress has been made. The personnel has remained unchanged, 20 productives and 4 non-productives. You still have 6 operators working below standard although the amount that they have fallen below is not so great. Not much improvement has taken place in the lost time (Cols. 14 and 15). The operators are working at a better B Hour (Col. 13) and this is reflected in the total productive B's for the day (Col. 12). The department B Hour (Col. 16) has shown better improvement still, because the penalties of lost time and B's under 60 are smaller and production is larger. The total Non-productive labour has stayed at the same total (Col. 28) although the items making up this total differ. The total ratio is now 5.4 (Col. 28), the improvement here being on account of the higher production shown in Col. 12. The total productive pay roll has increased although the number of productive operators has remained the same. In other words, the operators are making more money. Your productive cost (Col. 36) has approached nearer to the standard, although it has quite a distance to travel yet. Your non-productive cost (Col. 49) likewise has improved. The Cost Efficiency (Col. 53) and the Supervision B Hour show better results.

Now, on day No. 3, Cols. 1 and 2, reveal the fact that efforts are being made to trim down on the non-productive side. Instead of 20 and 4 operators on productive and non-productive, respectively, you have now 20.3 and 3.7. One non-productive operator is evidently spending a few hours

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per day on production. Two operators are still below standard, but the amount they fall short of standard is small. The operators' B. Hour has considerably increased. Total production has necessarily increased. Penalties (lost time and B's under Standard) form a still smaller percentage of your production figure. The productive cost per B is nearer to the Standard. The non-productive side has been reduced and with the greater production they have almost reached their ratio. Non-productive cost per B has improved. Cost Efficiency is now at 93 and the Supervision B Hour stands at 66. A week maintained at this performance means a bonus of 10% to the foreman and similar rewards in like proportion to other non-productives.

Now, let us look at day No. 4. I have here assumed that owing to production having steadily increased, all arrears are caught up and the department finds itself at a point where production has to be curtailed. With the operators having increased performances, you no longer need the amount of help you formerly had. They may be transferred to some other department, laid off, or carried along as idle help in your lost time column. We will assume they have been transferred. The department now consists of 17 operators in total. Their speed has again increased, lost time has been eliminated, non-productive help has been trimmed to keep pace with the cut in production and the department has met its ratio. They have a cost efficiency of 97 and a supervision B hour of nearly 76.

Outstanding Features of the System

I have dealt with many items and details at considerable length as I wanted to build up a connected story of this system. I am now going to briefly summarize a few of the outstanding features of this system as they appeal to me.

The outstanding feature of this system, outweighing all others, to my mind, is the establishment of a universal unit of measurement. This enables you to make comparisons regarding the efficiency of operators, departments and plants. We are able, for instance, to make comparisons between Rochester; London, England; and our Canadian plant. Many identical operations are going on in these three plants. There is quite a difference in wage levels at these three points which renders comparisons difficult to make without some such unit of measurement.

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This unit of measurement helps out in many problems of planning. You are making a standardized article, the total B's expended on it during its complete journey through your factory amounts to 100 B's per article. There are 20 B's in Dept. A, 30 B's in Dept. B, 40 in C and 10 in D. Of the 20 B's in Dept. A, 10 are units of 35c labour, 7 are of 40c and 3 are of 50c. You have your schedule of deliveries mapped out for say 6 months ahead. You know how many B's that you require in each department and how many of each class. In other words, by applying this measure, you can tell just how many operators of each class you need to get your product out on time. A similar check up can be made upon equipment.

Standard Labour Costs for this completed article can be set up if desired and the actual costs when they are issued can be compared with this standard. The Bedaux system, however, presents you with a new angle: that is, the Standard Labour Cost per unit. Performance against Standard Labour Cost, as you have already seen, is checked up daily and checked up by the man in the factory who is right next to the condition. This is a considerable step ahead of checking up Actual Cost against Standard on your finished article.

Standards are guaranteed as long as the job remains unchanged. This creates a feeling of confidence in the mind of the employee.

The operator can check up his performance day by day, can make comparisons with other operators' performances or with his own previous performance.

The Analysis Sheet is delivered to the department daily. It provides a definite measure of efficiency and, furthermore, it points out the weak spots where the department is losing out.

Some Defects

But there are one or two points that are yet short of the ideal. The difficulty of getting a just set-up on the non-productive side is a real one. The amount of water than can be squeezed out of labour costs prevailing prior to Bedaux is in some cases rather amazing. Is there any method that will give us an accurate measure of non-productive requirements? Bedaux has taken a definite step in the direction of non-productive control, but we do not pretend that it has reached the ideal. So far, we have heard of no other system

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that gets after the question and accomplishes similar results. However, it is a very elusive element to get; you are up against ever changing conditions and requirements. May be, in the future we may have something better.

In speaking of this control by methods of definite ratios between non-productive requirements and production you may have probably noticed a defect whereby theory does not keep step with actual practice. In the supposed department whose Analysis Sheet we are reviewing, it was apparent that about 13,000 B's of production daily justified the full time service of four non-productive operators. Suppose that the output for that department is doubled. The Analysis Sheet control then allows eight non-productives. Or, on the other hand, assume that production is halved, the control then allows you two non-productives. I do not have to point out to you that if your ratio is correct under normal conditions and that four non-productives is an ideal, then you do not need eight when your output is doubled, and you certainly would need more than two if your output is halved. The reason is, of course, that in your studies on the non-productives you timed many features that were constants, and many that were variables and treated them all alike. It would be possible, to set up a sliding scale of ratios for different levels of production by merely separating these constants from the variables. We have looked into this at various times, but have so far turned the idea down. It is an undoubted fact that whatever your non-productive set up is, it becomes easier of attainment as production increases and tighter as production decreases. To the supervision force our set-ups usually appear tight when first released and therefore production would have to increase considerably before any looseness would be apparent. This tightening of a standard as production decreases is, perhaps, not such an evil, although not correct. We have, therefore, not yet come around to the point where we are ready to put in the more correct sliding scale of non-productive control.

One great danger of all incentive methods (including piece work) is that quality may suffer, unless it is more closely watched than formerly. The more intensive your incentive methods, the greater your need to tighten your hold on quality. An incentive method such as Bedaux, that extends this incentive up to the department superintendent, increases this danger and places a greater responsibility upon the executives higher up for the maintenance of

MEMBERSHIP

quality. Let me hasten to say that our business demands that quality be closely guarded and maintained at a high level. I believe that our executives recognized this danger when we put this system in and are always looking around for any improvement that can be picked up in our methods of quality control. I believe it to be a fact, that it was on account of our management realizing this danger of quality being affected, that we have been enabled to dodge this pitfall.

I believe that no talk on Incentive Methods would be complete if this fact were not stressed, that, quality can suffer by the installation of Incentive Methods unless the measures to safeguard it are at the same time increased.

Membership

The following are new members of the Society:

Montreal Chapter

H. P. Nellis, Dominion Rubber Co., Ltd., 420 Lagauchetiere St.
J. G. Barrow, Dominion Rubber Co., Ltd., 420 Lagauchetiere St.
A. H. Billhan, Northern Elecceric Co., Ltd., 121 Shearer St. (Jun.).
D. Cameron, Shawinigan Water & Power Co., Ltd., Power Bldg.
Col. J. L. Regan, 260 St. James St.
Ladislas Joubert, C.G.A., C.P.A., 34 Rue Saint-Jacques Ouest.
N. P. Woods, Shawinigan Water & Power, Power Bldg.
C. W. Hemming, Shawinigan Water & Power, Power Bldg.
J. T. Stevens, Head Office, Bank of Montreal.

Winnipeg Chapter

O. H. Pollard, Saults & Pollard, Ltd., 300 Carleton St.
C. W. Nicholl, Dunwoody, Nicholl & Co., 604 Great West Permanent Bldg.
J. G. Mundie, C.A., Riddell, Stead, Graham & Hutchison, 436 Main Street.
M. P. H. Menlove, Parkhill Bedding Co., Ltd., Notre Dame & Erin Sts.
G. P. Fairbairn, Winnipeg Supply & Fuel Co., Ltd., 214 Avenue Bldg.
R. N. Mansergh, West-Woods, Ltd., Harold & Washington Ave., East Kildonan, Man.
J. S. Anderson, Western Canada Flour Mills., Co., Ltd., Union Trust Bldg.
A. F. Emery, Western King Mfg. Co., Ltd., McDermott Ave. and Kate Sts.
R. G. R. Govan, Western Sales Book Co., Ltd., Mulvey and Osborne Streets.
W. R. Grant, Lake of the Woods Milling Co., Ltd., 212 McDermott Ave.
D. S. Lofthouse, Success Business College, Ltd., 358½ Portage Ave.
E. J. Burleigh, Manitoba Rolling Mills, Ltd., Logan Ave., West.
W. J. Logan, Manitoba Bridge & Iron Works, Ltd., Logan Ave.
Lionel Katz, Bell Bottling Co., Ltd., 1087 Selkirk Ave.
S. A. Portigal, Geo. Loos & Company, 211 Curry Bldg.
Walter J. MacDonald, C.A., Royal Bank Bldg.
Harry Sharp, Sharp, Woodley & Co., 3113 Confederation Life Bldg.

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- Wm. Aitken, Canadian Co.-Op. Wheat Products, Ltd., 1000 Electric Chambers.
Ward W. McVey, MacDonald, McVey & Co., 460 Main Street.
D. C. Hodson, Dominion Bridge Co., Ltd., 702 Canada Bldg.
James N. Robb, Maple Leaf Milling Co., Ltd., Union Trust Bldg.
T. E. Saul, Dunwoody, Nichol & Co., 604 Great West Permanent Bldg.
R. Hillier, Provincial Paper Sales, Ltd., 315 William Ave.
F. A. Mathew, The Drewrys, Ltd., Redwood and Main Sts.
W. J. Marshall, Ogilvie Flour Mills Co., Ltd., 400 Nanton Bldg. (Jun.).
J. S. Mitchell, Manitoba Bridge & Iron Works Works, Ltd., Logan Ave. (Jun.).
A. J. Nichol, Manitoba Bridge & Iron Works, Ltd., Logan Ave. (Jun.).
W. Phillips, The Drewrys, Ltd., Redwood and Main St. (Jun.).
R. S. Aston, The Drewrys, Ltd., Redwood and Main St. (Jun.).
S. J. Blanfoy, Riddell, Stead, Graham & Hutchison, 436 Main St. (Jun.).
H. A. Black, Riddell, Stead, Graham & Hutchison, 436 Main St. (Jun.).
James Harper, The Royal Crown Soaps, Ltd., King and Henry Sts. (Jun.).
C. O. Taylor, Riddell, Stead, Graham & Hutchison, 436 Main St. (Jun.).
A. Jemmett, Riddell, Stead, Graham & Hutchison, 436 Main St. (Jun.).
G. S. N. Gostling, Western Sales Book Co., Ltd., Mulvey and Osborne Sts. (Jun.).

Toronto Chapter

- D. C. Brownell, Exide Batteries of Canada, Ltd. (Jun.).
C. M. Bain, Exide Batteries of Canada, Ltd. (Jun.).
J. Finley, Exide Batteries of Canada, Ltd. (Jun.).
Sidney A. Pougnet, M. P. Mallon, 33 Jarvis Street.
Edward Patten, Manton, Manton Bros., 97-103 Elizabeth Street.
Frank R. Brocklebank, A.S.A.A., Canadian General Securities, Ltd., National Bldg.

Hamilton Chapter

- Arthur Smith, The Steel Company of Canada, Ltd. (Jun.).
A. Sharpe, The Steel Company of Canada, Ltd. (Jun.).
A. Schaefer, The Steel Company of Canada, Ltd. (Jun.).
A. C. Fraser, The Steel Company of Canada, Ltd. (Jun.).
A. J. Cooley, The Steel Company of Canada, Ltd. (Jun.).
G. S. Brown, The Steel Company of Canada, Ltd. (Jun.).
Allan B. Taggart, Firestone Tire & Rubber Co., Ltd., Beach Road (Jun.).
Donald R. Caskie, Firestone Tire & Rubber Co., Ltd., Beach Road (Jun.).
A. J. Ballantyne, Firestone Tire & Rubber Co., Ltd., Beach Road.
John Farmer, N. Slater Co., Ltd., Sydney Street (Jun.).

Calgary

- Frank M. Harvey, Harvey & Morrison, 529 Lougheed Bldg., Calgary.

Examinations for Cost Accountants

THE attention of members of the Society, and others who may be interested, is directed to the examinations which are proposed to be held next May, in accordance with the plan recently adopted by the Society.

The requirements for candidates may be ascertained by writing to the headquarters of the Society, 81 Victoria St., Toronto. Application to try the Examinations must be made on the forms provided by the Society. The date for receiving these applications has been extended to December 31st.

Examinations will be held, as required, in each Chapter centre—Montreal, Toronto, Hamilton and Winnipeg. Special arrangements may also be made for the holding of examinations at other points.

A prize of \$15 is offered for the most successful candidate at the Second Examination, and one of \$10 for the most successful candidate at the First Examination, by L. Belanger, C.P.A., C.G.A., Past President of the Society.

Those who already have copies of the Examination requirements, please note the following changes:

The text-book for Law will be the "Summary of Canadian Mercantile Law," by Anger, of Toronto, and not the "Digest of Canadian Mercantile Law," as originally stated.

The Cost Accounting of the First Examination will cover the following:—

Manual of Cost Accounts, Lunt, Pitman, Toronto. Chapters 1 to 12.

Cost Accounting, Nicholson and Rohrback, Ronald Press, New York. Chaps. 1 to 11.

The questions shewn for the following subjects are sample questions: They are not intended to show representative examination papers:—

First Exam. Commercial Law and Bills of Exchange Act.
Statute Law.

Final Exam. Cost Accounting.

Factory Administration.

In all of the above cases the phrases "Time allowed 3 hrs." or "Time allowed 4 hrs." should be omitted.

NEW BOOKS

ACCOUNTING method, by C. Rufus Rorem, C.P.A., Assistant Professor of Accounting, The University of Chicago. 596 pages, \$5.00. The Macmillan Company of Canada, Bond Street, Toronto.

This is a book for the accountant who wishes to understand the broad purpose and use of accounts. Mr. Rorem describes accounting as "a tool for use in the control of economic activity. It is a device for measuring and interpreting certain quantitatively expressed facts of an enterprise, meaning by 'enterprise' any type of organization which deals with the manipulation of those social resources commonly called 'economic goods.' Accounting is a special method for dealing with the economic facts of a given enterprise."

The book is divided into four main parts, as follows:

1, The Role of Accounting in Modern Economic Life. 2, Double Entry Accounting. 3, Accounting Valuation. 4, Interpretation of Accounting Data.

The author refers to the book as intended for use of senior college students, but all public accountants, and any one engaged in directing an accounting system, or interpreting its figures from the viewpoint of business administration, will find the book worthy of careful study over a period of time, for the field is covered so thoroughly that it cannot be absorbed in any brief reading.

Numerous illustrations are brought in throughout the book, to show the different forms of account and their uses, and at the conclusion there is a series of exercises. One of the closing chapters deals with Administrative Uses of Cost Data, which will be especially valuable to the cost accountant, while a chapter on Social Control through Accounts brings out important points on the purpose and value of accounting as a whole.

CHAPTER NOTES

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MONTREAL

Montreal's season had a brilliant opening on September 27th, when Mr. W. H. Coverdale addressed a dinner meeting at the Windsor Hotel. G. C. Leroux was in the Chair, and among those at the head table were several professors of McGill University, Professor Lucien Favreau representing the University of Montreal, and the School of Higher Commercial Studies, Hon. Raoul Grothe, J. R. Thivierge of La Banque Canadienne Nationale, G. St. Pierre, K.C., V. Gratton, L. Belanger and others.

Mr. Coverdale holds the degrees of B.A., Dr.Sc., and LL.D., and is a prominent business man, being president of Canada Steamship Lines, Ltd., of the Century Coal Company, Ltd., and of the Midland Shipbuilding Company; vice-president of the Consolidated Coal Products Company; director of the Bank of America; director of the Birmingham and Northwestern Railway Company and the Meridian and Memphis Railway Company; member of the American Society of Civil Engineers; and member of the American Society of Consulting Engineers. His address received wide publicity in Montreal, and as it is printed in *Cost and Management*, no comment is required here. Several others spoke briefly, and L. A. Peto, vice-chairman of the Chapter, extended the thanks of the Society to Mr. Coverdale.

On October 11th Dean Laureys, director of the School of Higher Commercial Studies, Montreal, Spoke on "The Instalment Plan, from the Economic and Social Point of View." Dean Laureys is already well known to the Society in Montreal. His address was most thorough, and brought out a good discussion. It will be printed in an early issue of *Cost and Management*.

Lorenzo Belanger, C.P.A., C.G.A., "the grand old man" of cost accountancy in Montreal, was the speaker at the meeting on October 25th. Mr. Belanger has been associated with the Society since its formation. In 1926 he was chairman of Montreal Chapter, last year he was president of the Society, and he now serves as a member of the Examination Committee. A large attendance, which included several guests from the Canadian General Accountants' Association, listened with exceptional interest to Mr. Belanger's most instructive paper on "Costs and the Incidence and Incidents of Taxation." This address is also to appear in *Cost and Management*.

TORONTO

The first two meetings of Toronto Chapter this season were intensely practical, and brought forth attendance which was well ahead of last year. On October 10th, W. B. Smith, of the Burroughs Adding Machine Company, spoke on "Office Machine Application and its Relation to Cost and Accounting Problems." On the 24th the speaker was W. R. Hodgson, industrial engineer of the Canadian Kodak Company, Ltd., Toronto, with the subject "An Outline of the Bedaux Point System." The opportunity of hearing an authority on this method of wage payment was a welcome one, and Mr. Hodgson's

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paper appears in this issue. Mr. Smith's subject was obviously of interest to every member, and we trust that his address will be available for printing in a later number.

HAMILTON

Hamilton's opening night on October 17th, in the form of a dinner at the Wentworth Arms Hotel, was a little later than usual this year, but the evening was enjoyable and beneficial. There is probably no one more prominent in the industrial field in Hamilton than H. H. Champ, vice-president of the Steel Company, of Hamilton, and his account of the International Labour Conference held in Geneva was most acceptable. Some details about this may be available for printing in our publication. James Turner, C.A., who is president of the Society this year, followed with an outline of its work, and he emphasized the growing opportunities for such a body.

The second meeting of the Chapter was held in the Hamilton Chamber of Commerce Rooms on Tuesday, October 30th, at 7.45 p.m. Mr. T. Norman Dean, Statistician of the Ontario Workmen's Compensation Board, who had promised to address the members, was prevented from doing so by sickness, but the situation was taken care of by several members of the accounting staff of The Steel Company of Canada, Limited, who introduced subjects with which they are especially familiar. Mr. G. S. Brown described the equipment and system of the tabulating department. Mr. A. Schaefer replied to various inquiries relative to the method of costing used in the Hamilton Works. Questions relative to purchasing and accounts payable records were dealt with by Mr. A. Sharpe, and general accounting principles were handled by Mr. Frazer. The discussion which took place on the various points was extremely instructive and the response to the vote of thanks, proposed by Mr. Love and seconded by Mr. Meeke, showed how much the members of the Chapter appreciated the efforts of Mr. LeBrocq and his colleagues to fill the unavoidable vacancy caused by the absence of the anticipated speaker.

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